

Opening of pygofer about as broad as long, dorsal emargination large, anal angles well produced, slightly curved; genital styles straight, outer edge slightly sinuous, inner edge produced into a quadrate process near base, apex truncate; aedeagus flattened laterally, broad, apex rounded, an irregular row of spines from near apex on dorsal aspect across left side to near the medio-ventral area, a somewhat similar row on right side; anal spines large, curved, their bases near together.

Length, 2 mm.; tegmen, 2·2 mm.

NIGERIA: Oloke-Meji (*J. C. Bridwell*).

Described from one male.

***Dicranotropis bridwelli*, sp. nov.** (fig. 3).

♂. Macropterous; head as broad as prothorax; width twice the length, including eyes; vertex square; length of face nearly twice the width (1 to 1·8), narrowed between eyes and slightly at apex, median carina furcate about middle; length of the first joint of antennae slightly more than half the second, terete. Length of first joint of hind tarsus equal to the other two together; spur as long as first joint of tarsus, thin, concavo-convex, with many small teeth on hind margin.

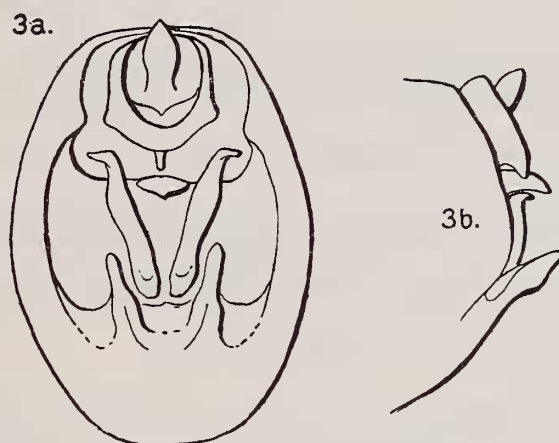


Fig. 3. *Dicranotropis bridwelli* Muir, sp. n.;
a, pygofer, back view; b, do., side view.

Dark chestnut-brown or black; antennae, carinae on head and thorax, rostrum and legs lighter brown; base of dorsum of abdomen and middle of apical tergite light. Tegmina hyaline, fuscous, a clearer hyaline area over subcostal, radial and median apical cells, veins of the same colour as membrane, granules small, bearing small black hairs; wings hyaline with brown veins.

Pygofer as figured (fig. 3).

Length, 2·9 mm.; tegmen, 3·8 mm.

NIGERIA: Oloke-Meji, Ibadan, 1914, on coarse grass (*J. C. Bridwell*).

Described from one male specimen. There are two female specimens in the collection which may be this species; they are much lighter, being nearly uniformly light brown.

***Dicranotropis ibadanensis*, sp. nov.** (fig. 4).

♂. Macropterous; head as wide as pronotum, width 2·2 times the length including eyes; vertex square or very slightly wider than long, base slightly behind middle of eye; length of face twice the width, sides slightly curved, narrowest

between eyes and at apex, furcation of median carina one-third from base ; antennae reaching to near middle of clypeus, first joint slightly shorter than second ; first joint of hind tarsus as long as the other two together, spur slightly shorter than first joint of tarsus, with many small teeth on hind margin.

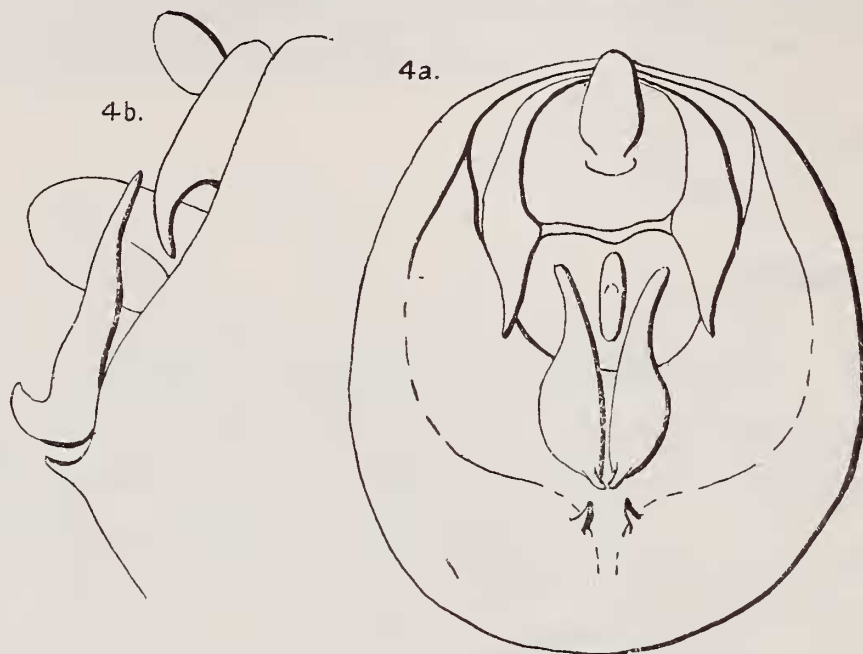


Fig. 4. *Dicerantropis ibadanensis*, Muir, sp. n. ;
a, pygofer, back view ; b, do., side view.

Light brown, nearly black over clypeus, coxae and abdomen ; carinae of thorax lighter, traces of lighter spots on face. Tegmina hyaline, a curved, fuscous mark from cross-veins over cubitus extending along veins to the apex of media and cubitus, veins basad of cross-veins yellowish, distad of cross-veins darker, granules few and small ; wings hyaline with brown veins.

Pygofer as figured (fig. 4).

Length, 1.9 mm. ; tegmen, 2.8 mm.

NIGERIA : Oleke-Meji, Ibadan, 1914 (*J. C. Bridwell*).

Described from one male.

Genus *Megamelus*, Fieber.

There are a number of closely allied species of this genus having similar facies, with a wide distribution. Only a close comparison of series from various localities will enable one to decide where one species ends and another begins. I sank *M. kolophon* (Kirk.) into *M. furcifer* (Horv.), but I believe it will be better to retain the name as a variety until more material has been studied. I now recognise three varieties of this species, viz. :—

1. *M. furcifer* (Horv.) (fig. 5). The fork at apex of the genital styles small ; clavus with a small black mark at apex.

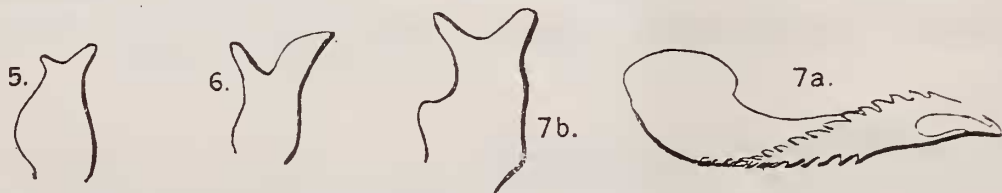


Fig. 5. *Megamelus furcifer*, Horv., genital style.
6. " *kolophon*, Kirk "
7. " *nigeriensis*, Muir, var. n. ; a, aedeagus ; b, genital style.

2. *M. kolophon* (Kirk.) (fig. 6). Fork at the apex of the genital styles much larger; no black mark at the apex of clavus; aedeagus slightly smaller, with smaller spines.

3. *M. nigeriensis*, var. nov. (figs 7 a, 7 b). Fork at apex of genital styles wider and the emargination between them shallower; a dark mark at the apex of clavus.

These forms come near to *Kelisia kirkaldyi*, Muir, and *Kelisia fieberi*, Muir, and eventually will be placed together in the same genus. Until I can revise these genera I prefer to let them remain as they are for the present.

Megamelus furcifer, var. **nigeriensis**, nov. (figs. 7 a, 7 b).

♂. Macropterous; length of head, prothorax and mesothorax about 1.5 times the width of the head including eyes, vertex slightly longer than wide; length of face 2.5 times the width, narrowest between eyes, furcation of median carina at extreme base; antennae terete, reaching beyond the base of clypeus, second joint 1.4 times the length of first; first joint of hind tarsus as long as the other two together, spur longer than first joint of tarsus, large, with many small teeth on hind margin. Carinae of face and clypeus, vertex, middle and lateral portions of pronotum, middle of mesonotum, tegulae and base of abdomen yellow; face and clypeus between carinae, medio-lateral portions of pronotum, lateral portions of mesonotum and greater portion of abdomen black; front and middle legs dark brown, hind legs lighter brown. Tegmina hyaline, a dark mark at end of clavus and fuscous over apical veins.

The pygofer is similar to that of *M. kolophon*, Kirk.,* but the genital styles are wider at the apex and not so deeply indented, the aedeagus is slightly larger and the spines stronger.

Length, 2 mm.; tegmen, 2.3 mm.

NIGERIA: Oloke-Meji, Ibadan, 1914 (*J. C. Bridwell*).

Described from two males.

Megamelus flavolineatus, sp. nov. (fig. 8).

♂. Macropterous; width of head including eyes 1.6 times the length, nearly as wide as the pronotum; length of vertex 1.4 times the width; antennae reaching beyond the base of clypeus, first joint more than half the length of the second

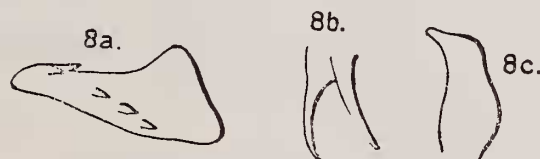


Fig. 8. *Megamelus flavolineatus*, Muir, sp. n.; a, aedeagus; b, anal spines; c, genital style.

(1 to 1.7); length of face 2.5 times the width, slightly narrowed between eyes, sides subparallel, median carina forked at middle of face; first joint of hind tarsus as long as the other two together, spur nearly as long as the first joint of tarsus, large, thin, with many small teeth on the hind margin.

* Haw. Sugar Planters Assn. Ent. Bull. iii, pl. xv, figs. 9-10.

Dark brown or black; vertex, carinae of head, middle and lateral margins of pronotum, middle of mesonotum, tegulae, antennae and legs yellow or light brown. Tegmina hyaline, veins yellow or light brown, a dark mark at apex of clavus, fuscous over apical portion of cubital veins.

Aedeagus short, deep at base where it is laterally compressed, a row of three or four spines on the right side and another somewhat similar row on the left; anal spines large, slightly curved and pointed; genital style as figured (fig. 8, c).

Length, 1.8 mm.; tegmen, 2.5 mm.

♀. Macropterous; similar in colour to the male.

Length, 2.0 mm.; tegmen, 3.0 mm.

NIGERIA: Oloke-Meji, Ibadan, 1914 (*J. C. Bridwell*).

Described from six males and eleven females. Some of the specimens are lighter in colour than the type, especially between the carinae of clypeus and genae.

Phyllodinus badius, sp. nov.

♀. Macropterous; head as wide as pronotum, width 2.4 times the length; vertex wider than long; length of face double the width, narrowest between eyes and at apex, median carina furcate slightly distad of middle; antennae terete, reaching slightly beyond the base of clypeus, first joint slightly shorter than second; femora and tibiae of first and second legs and femora of hind legs flattened and expanded; lateral pronotal carinae divergently curved, not reaching the hind margin. First joint of hind tarsus equal in length to the other two together; spur as long as first joint of tarsus, many small teeth on hind margin.

Dark chestnut or nearly black; carinae of head and thorax, second joint of antennae, middle and lateral margins of pronotum, middle of mesonotum, four or five pairs of small spots on face, middle and hind femora and hind tibiae lighter brown. Tegmina hyaline; before the cross-veins the veins are light narrowly bordered with brown, with small light granules; beyond the cross-veins the veins are of the same colour as the membrane, which is brown over the cubital area and over the radial apical veins, spreading into the membrane; wings hyaline, with brown veins.

Length. 2.9 mm.; tegmen, 4.0 mm.

♀. Brachypterous; in colour similar to the macropterous form. As in most brachypterous Delphacids the reduction is mainly in the apical cells. The middle of the membrane between the veins is raised in longitudinal ridges, giving the tegmina the appearance of having numerous veins.

Length 2.7 mm.; tegmen, 2.00 mm.

NIGERIA: Oloke-Meji, Ibadan, 1914 (*J. C. Bridwell*).

Described from two macropterous and one brachypterous females, the type being one of the former. The second macropterous specimen is darker than the type.

INSECTS INJURIOUS TO ECONOMIC CROPS IN THE ZANZIBAR PROTECTORATE.

By W. MANSFIELD-ADERS,
Government Economic Biologist, Zanzibar.

(PLATES XIII–XV.)

The following notes on the various insects injurious to the economic crops of the Zanzibar Protectorate are based on investigations made during the last few years.

The chief economic products of the two islands (Zanzibar and Pemba) are cloves and coconuts, the former being of greater importance.

INSECTS AFFECTING CLOVES.

Fortunately no insect pests of the clove tree (*Eugenia caryophyllata*) have been discovered, but it is apparent in many plantations that a number of trees are unthrifty and die. The cause of death still remains uncertain, but most of the evidence points to some physiological condition, such as waterlogging of the roots near swamps, denudation of alluvial soil on slopes, or the tap-root reaching an impervious layer of stone. The bark of certain unhealthy trees is attacked by termites (*Termes bellicosus*) and dead branches are infested with various species of Bostrychid beetles. Some young clove trees from Pemba had been killed by *T. bellicosus* feeding on the bark of the lateral roots.

The adults of a large Tenebrionid beetle, *Pycnocerus passerinii*, Bertol., have been found on several occasions lurking under dead bark on clove trees, while larvae and pupae occur in deep tree-holes filled with decomposing vegetation; I am of opinion that they do no actual damage, but only feed on dead bark, etc.

Several experiments have been undertaken to test whether various omnivorous Lepidopterous larvae, such as those of *Euproctis producta*, would feed on clove trees when deprived of other food, but all died.

INSECTS AFFECTING COCONUTS.

Oryctes monoceros and *O. boas*. These two rhinoceros beetles are common throughout the two islands and are a serious menace to the coconut industry, the former being the commoner species. The damage done to young trees is often very serious; in some plantations more than half of the trees from 2½ to 3 years old are killed, while others are stunted and their productiveness much reduced. A certain number of trees survive initial attacks, but as their growth is retarded, they take a long time to reach maturity. Mature trees rarely succumb to the attacks of the beetles, although a number of felled trees were found to harbour the insects.

The following record of the life-history of *Oryctes monoceros* has been obtained:—

Eggs found in dead coconut trunk	..	..	..	11. viii. 1917.
Eggs hatched	..	..	..	19. viii. 1917.
Larvae started to build pupal cell	..	..	..	5. xii. 1917.
Pupal cell completed and pupa formed	..	..	..	10. xii. 1917.
Adults emerged	..	..	..	28. xii. 1917.

It will be seen from this that the length of the larval life is 113 days, that of the pupa 18 days.

After the mature larvae had built their pupal cell they shrunk considerably in size and became very sluggish before pupating; this period of inertia lasted 5 days.

Pupae are often found in association with larvae in old coconut trunks, generally among the coarse fibres where disintegration has not yet taken place; the larvae prefer the centre, where the fibres have been reduced to the consistency of a warm moist debris.

The larvae of *Oryctes boas* are more usually found in rubbish heaps composed of decomposing vegetable matter and manure. I have found manure heaps riddled with larvae of all ages; horse and donkey droppings seem the most attractive.

The following preventive measures have been tried:—

(1). Traps have been set in various localities filled with rotting coconut trunks, decaying vegetation, etc.; the addition of a little horse manure enhances their attractiveness and they have given excellent results.

(2). The collection of adults and larvae by natives has been tried in East Africa, but the results were not encouraging.

(3). In small plantations the daily examination of all young trees (from 2½ to 3 years old) for adult beetles should be quite efficacious. The easiest method is to insert a small piece of wire with harpoon points into the entrance hole, transfix the beetle and withdraw it. After a little experience the palms harbouring beetles are easily recognised by the moist tow-like frass protruding from the entry holes. Sprinkling dry earth or sand in the crowns of the young trees may possibly act as a deterrent to adult beetles. There is no doubt that bare plantations and isolated trees are more severely attacked, probably because the beetle being a heavy sluggish flier is able to alight more easily on its food-plant under these conditions. The planting of some tall bushy catch-crop, such as *Cajanus indicus*, around the plantation might be efficacious.

Some imported larvae infected with a fungus (*Metarrhizium anisopliae*) were received, and it was proved that our local larvae are susceptible to the disease; further, in some control experiments one case of actual indigenous infection was found. A long series of experiments with a view to introducing this fungus was planned, but owing to unforeseen circumstances all work in this direction was abandoned.

I have on several occasions seen young trees suffering from what might be called bud-rot. The whole of the crown is easily pulled out leaving a hollow depression full of dark fluid with a most foetid odour. It may perhaps be proved later that bud-rot is secondary to the attacks of the beetle.

To summarise the above:—The rhinoceros beetles (*Oryctes monoceros* and *O. boas*) are common throughout Zanzibar and Pemba, and are the most serious pests of the coconut industry. Young trees from 2½ to 3 years old are most usually attacked, many are killed, others greatly delayed in reaching maturity. Trees in isolated positions and on bad soil are more often attacked. Fully matured trees harbour adult beetles, but the damage to them is not serious. The most useful preventive measure is the trapping of larvae in pits filled with rotting coconut trunks, vegetable debris and a little manure.